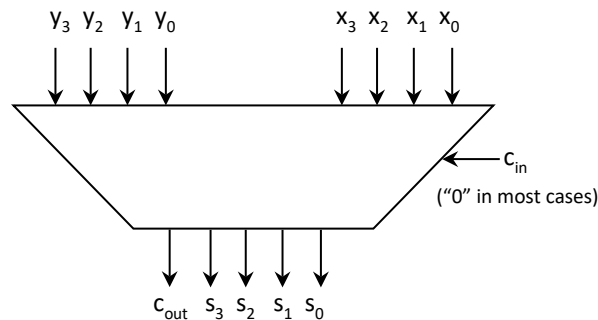




**2020 Fall - ECE 2220 Laboratory 5 : 4 bit BCD Adder**

The following is a block diagram of a 4 bit adder like that found in a 7483 IC. It takes two 4-bit binary numbers in (plus a carry-in) and gives the addition of the two numbers as a 5-bit binary word (4-bit sum and a carry-out).



7483 4-bit Adder

- a) Write a Verilog code to implement the above 4-bit adder circuit.

Use switches SW[3], SW[2], SW[1] and SW[0] to input binary number  $x_3 x_2 x_1 x_0$  and SW[9], SW[8], SW[7] and SW[6] to input binary number  $y_3 y_2 y_1 y_0$ .

**Display Outputs**

Use BCD to SSD converter technique you implemented in Lab 3 to convert and display the inputs  $y_4 y_3 y_2 y_1$  on the SSD HEX[3] and HEX[2] and  $x_4 x_3 x_2 x_1$  on the SSD HEX[1] and HEX[0].

**Display Outputs**

Use the BCD to SSD converter to convert the output from the adder -  $c_4 s_4 s_3 s_2 s_1$ . When converted to BCD it needs 2 digits to display the number in decimal format. Therefore you will need two SSD displays. Use HEX[5] and HEX[4] to show each input and output as specified above. If any number is less than 10 the higher decimal should be blank – not zero.

This should be done in several modules. For example a top module, a bitwise full adder module, an adder module for all four bits, a module to convert the binary number to BCD, and a module to output the numbers to the 7-segment display. If desired, you may use previous code that you have written.

Upload your code, including all modules you have written, to UM Learn.